

TYPICAL CONDUIT INSTALLATION FOR PVC ENCASED MAJOR CONDUIT LINE

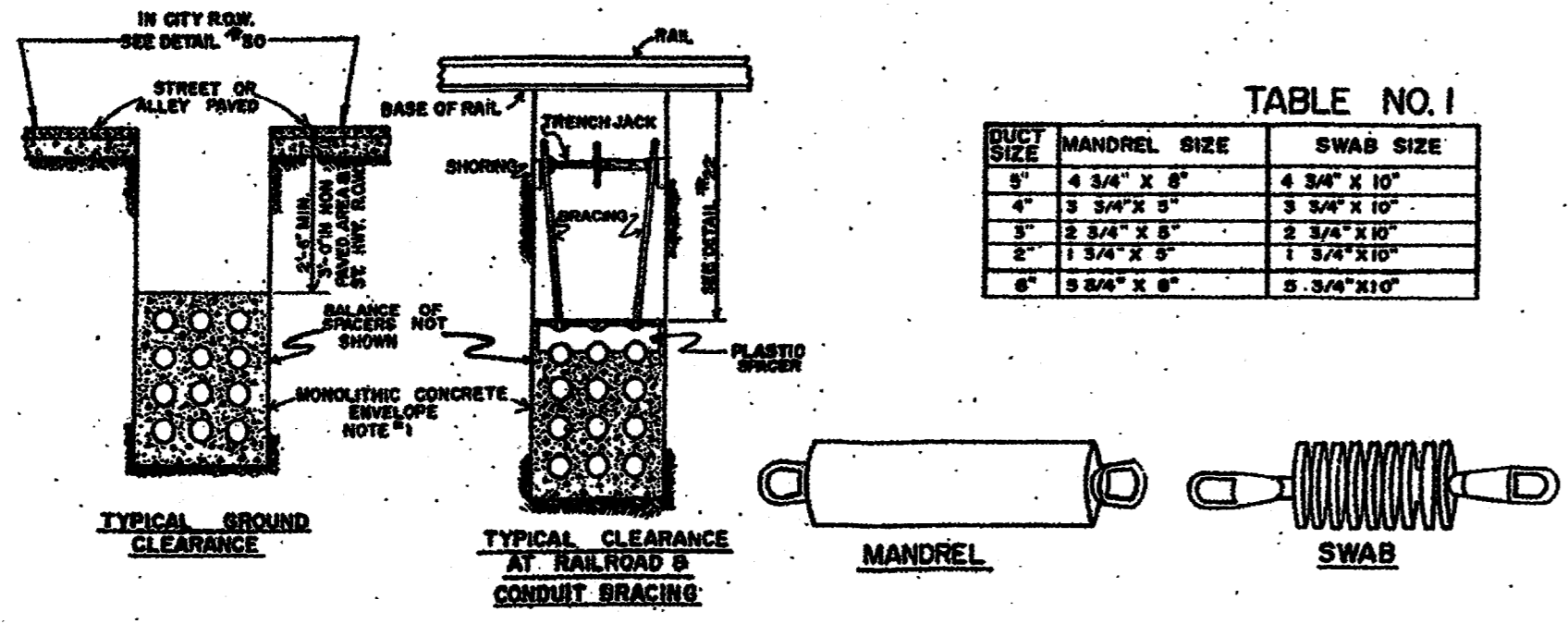
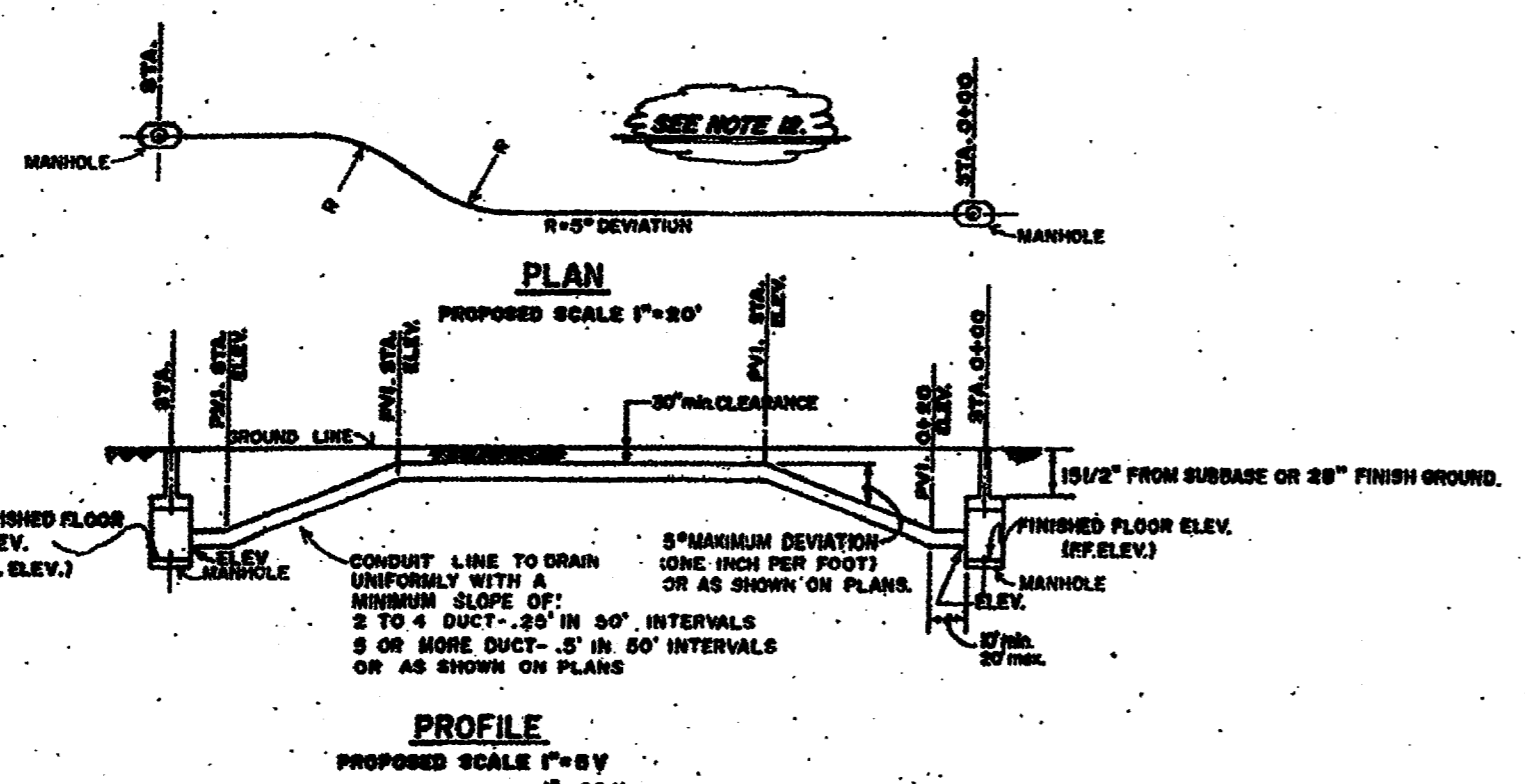


TABLE NO. 1

DUCT SIZE	MANDREL SIZE	SWAB SIZE
4" x 4"	4 3/4" x 8"	4 3/4" x 10"
6" x 6"	5 3/4" x 8"	5 3/4" x 10"
8" x 8"	8 3/4" x 8"	8 3/4" x 10"
10" x 10"	9 3/4" x 8"	9 3/4" x 10"
12" x 12"	11 3/4" x 8"	11 3/4" x 10"



- NOTES:
1. ALL SECTIONS OF THE CONDUIT WILL BE RUN IN A STRAIGHT LINE AS CONDITIONS WILL PERMIT. DEVIATIONS WILL BE LAID OUT BY THE POWER COMPANY ENGINEER.
  2. THE CONDUIT & FITTINGS WILL BE COATED LINEARLY WITH PVC GEMENT. PUSH CONDUIT AND FITTING TOGETHER UNTIL CONDUIT BUTTS AGAINST FITTING SHOULDER. TWIST CONDUIT 1/4 TURN TO ASSURE SMOOTH SPREADING OF GEMENT. NORMAL MIN. COVER TO BE 30".
  3. WHEN COMPLETE, EACH CONDUIT OF A MAIN DUCT LINE WILL HAVE A MANDREL AND SWAB PULLED THROUGH THE ENTIRE LENGTH OF EACH CONDUIT OF A LATERAL LINE WILL HAVE A SWAB PULLED THROUGH THE ENTIRE LENGTH TO CHECK FOR BLOCKAGE OR OTHER UNDESIRABLE CONDITIONS. SEE TABLE NO. 1 FOR MANDREL AND SWAB SIZE FOR CORRESPONDING CONDUIT SIZE.
  4. ALL DITCH CUTS WILL BE IN ACCORDANCE WITH EXISTING SAFETY REGULATIONS IN EFFECT.
  5. ALL CONDUIT RUNS ON I.L. & STATE H.V. R.O.W. WILL REQUIRE A MINIMUM OF 6" CONCRETE COVER FROM THE UPPERMOST DUCT, AND MIN. 9" COVER FROM FINISH GRADE.
  6. SEE PLANS FOR CONDUIT ARRANGEMENT.
  7. FOR NUMBER, FORMATION, AND SIZE OF CONDUITS SEE JOB PLANS.
  8. HIGH EARLY STRENGTH CEMENT PROHIBITED.
  9. SHOW DITCH ELEVATION @ 50' INTERVALS & EACH GRADE CHANGE AND AT MANHOLE ENTRANCE.
  10. SHOW MANHOLE FINISH FLOOR ELEVATION.
  11. ALL CONDUIT TO BE TYPE XX OR XX-1 UNLESS OTHERWISE NOTED ON PLANS.
  12. GUTTER EVERY 100' IN PLAN VIEW AND EVERY 50' WITH ELEVATION IN PROFILE PLUS WIDTH AND ELEVATION AT EACH GRADE CHANGE.

DETAIL #19

SECTIONS OF TYPICAL FORMATION

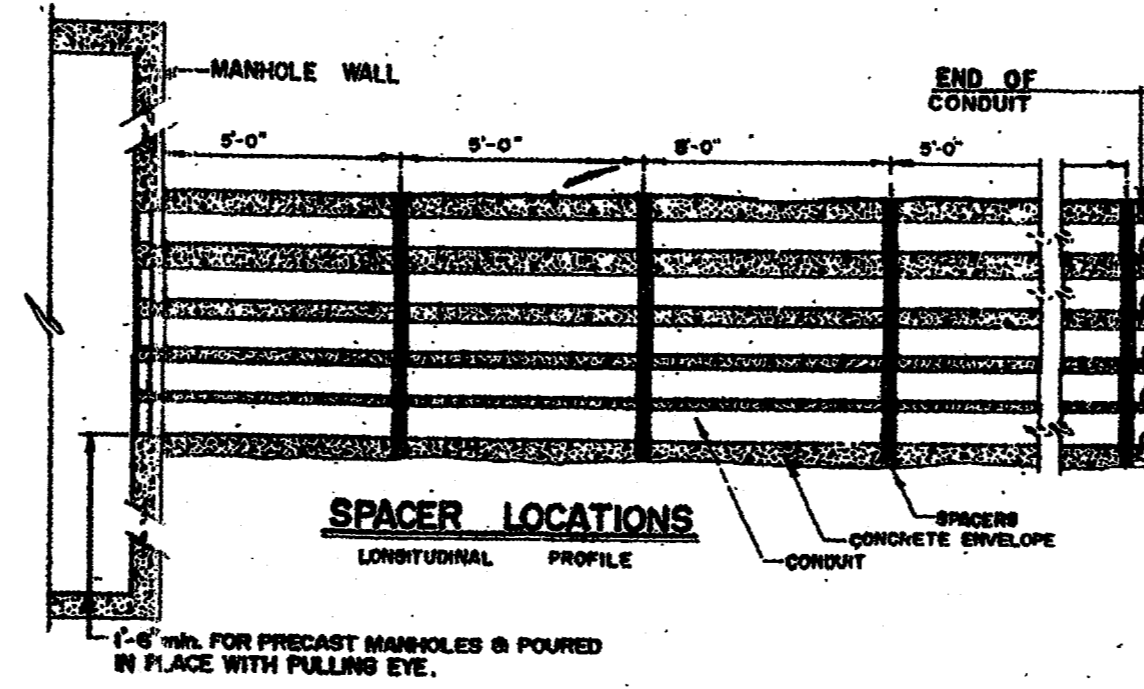
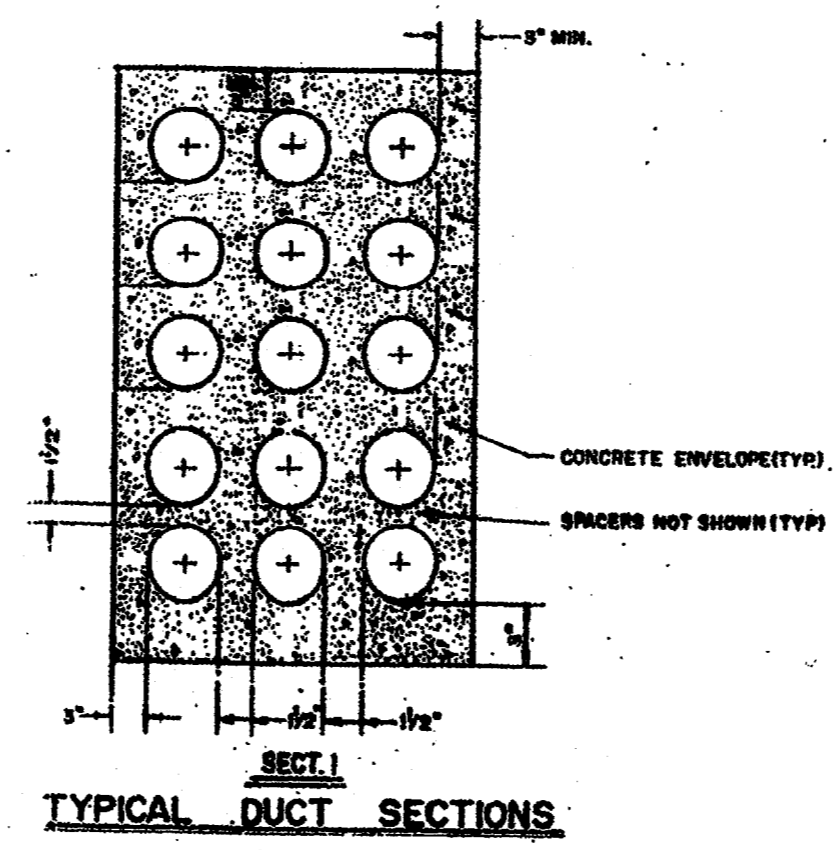


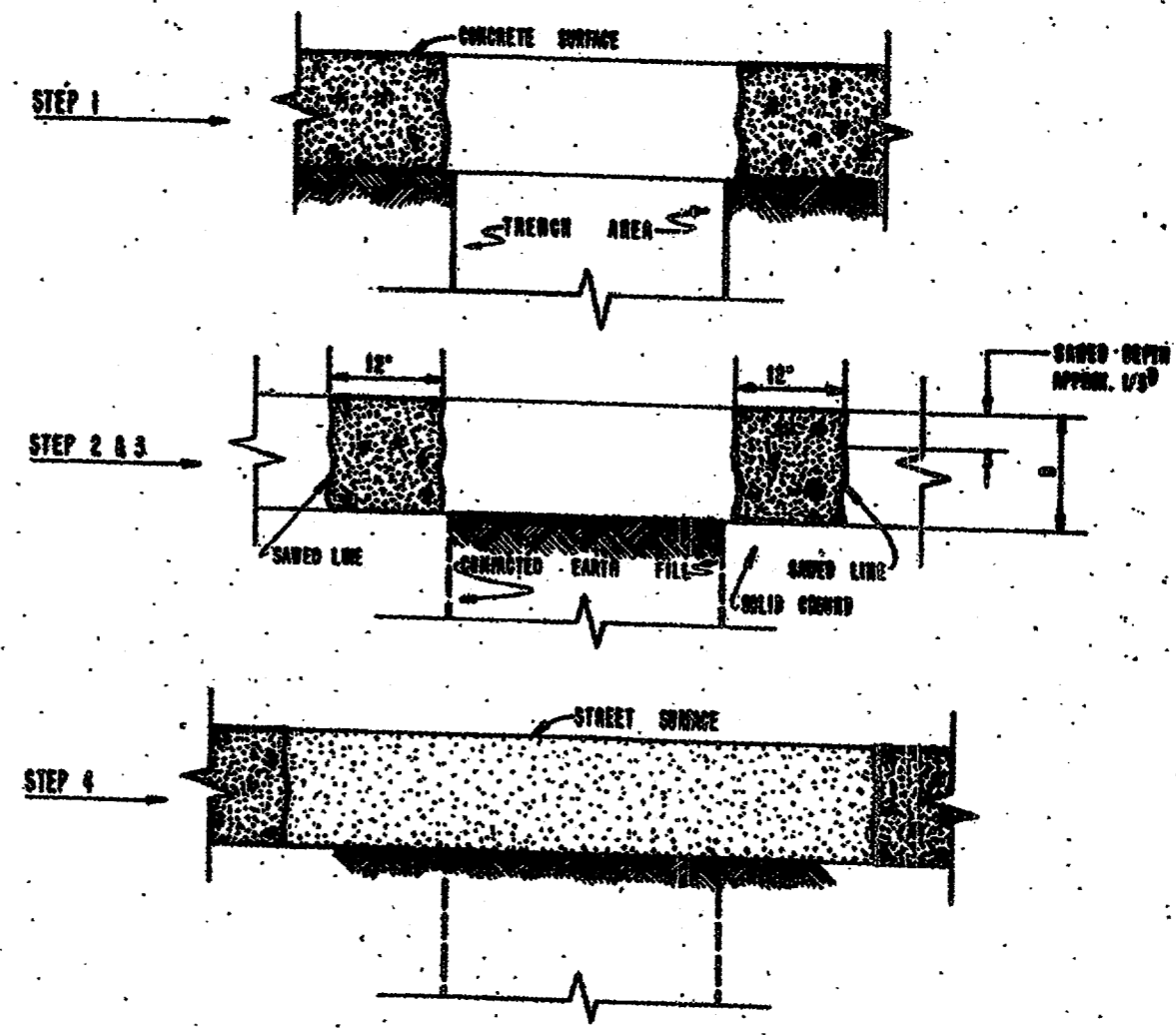
TABLE 2

CONDUIT SIZE	OUTSIDE DIAMETER	TYPE
4"	3.58"	PVC
6"	5.00"	PVC
8"	6.00"	PVC
10"	7.00"	PVC
12"	8.00"	PVC
		PVC CEMENT

DETAIL #20

SEQUENCE OF CONSTRUCTION

- STEP 1: SUFFICIENT CONCRETE WILL BE REMOVED TO PERMIT TRENCH EXCAVATION.
- STEP 2: UPON COMPLETION OF THE INSTALLATION OF THE CONDUIT LINE, THE TRENCH WILL BE MODELLED AND CONTACTED TO THE REQUIRED DENSITY UP TO THE BASE OF PAVEMENT.
- STEP 3: THE CONCRETE PAVEMENT WILL BE SAVED TO A DEPTH OF APPROXIMATELY ONE THIRD OF THE DEPTH OF PAVEMENT, PARALLEL TO THE LINE OF TRENCH, ONE FOOT BACK OF SOLID EXISTING PAVING BREAK-ERS CAN THEN BE USED TO BREAK THE EXCESS CONCRETE.
- STEP 4: THE EXPOSED EDGES OF THE CONCRETE WILL BE CLEANED SO A GOOD BOND CAN BE OBTAINED WHEN ROAD IS FILLED.



NOTE: ASPHALT DRIVING SURFACES; SEQUENCE OF CONSTRUCTION ON CONCRETE SURFACES WITH ASPHALT DRIVING SURFACES WILL BE THE SAME AS SEQUENCE, EXCEPT STEP 3, THE ASPHALT WILL BE CUT IN A STRAIGHT LINE USING AN APPROXIMATELY ACCEPTABLE WITH THE CITY SPECIFICATIONS. SAWING OF THE CONCRETE WILL NOT BE REQUIRED.

STREET BREAKING AND REPLACEMENT DETAILS

DETAIL #21  
CONCRETE SPECIFICATION

- I. GENERAL
- THESE SPECIFICATIONS APPLY TO MANHOLE, VAULT, AND DUCT LINE CONSTRUCTION ON THE UNDERGROUND SYSTEM IN THE DOWNTOWN DISTRICTS. THE CONCRETE SHALL BE OF ONE OF THE CLASSES SPECIFIED ON THE DRAWINGS FOR THE TYPE OF WORK UNDER CONSTRUCTION. THE RATIO OF SAND TO CEMENT SHALL BE USED TO OBTAIN AS HIGH AND CONSISTENT CONCRETE AS POSSIBLE WITH THE MATERIALS AVAILABLE AND FOR THE CLASS OF WORK UNDER CONSTRUCTION, BUT IN NO CASE SHALL THE RATIO OF CEMENT TO THE HEAVY CONTENTS BE LESS THAN THE CLASS OF CONCRETE SPECIFIED.
- II. SPECIFICATIONS FOR MATERIALS
- A. CEMENT: THE CEMENT SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PORTLAND CEMENT" ASTM C-150 FOR TYPE 1 NORMAL PORTLAND CEMENT AND TYPE III, HIGH-EARLY-STRENGTH PORTLAND CEMENT. THE CEMENT SHALL BE PROPERLY PROTECTED FROM THE WEATHER UNTIL USED AND SHALL BE DRY AND FREE FROM Lumps WHEN PLACED IN THE MIXER.
- B. SAND: THE SAND SHALL CONSIST OF HARD SANDS, FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, THAT IS INHIBITORY TO CEMENT. THE SAND SHALL BE GRADDED IN SIZE FROM ONE-TWENTY INCH DOWN, WITH NOT MORE THAN FIVE PER CENT BY WEIGHT OVER AND UNDER, PASSING A 50 MESH PER LINEAL FEET SIZE AND NOT MORE THAN FIVE PER CENT PASSING A 100 MESH PER LINEAL FEET SIZE. THREE PER CENT BY WEIGHT OF SLAY OR LUMP, OR A COMBINATION OF THE TWO, WILL BE PERMITTED PROVIDED THEY WILL PULVERIZED AND DISTRIBUTED THROUGHOUT THE MIX. THE FINEST SIZES SHALL NOT BE LESS THAN 2.5 AND NOT MORE THAN 2.0.
- C. MANHOLE GRAVEL: THE GRAVEL SHALL CONSIST OF CLEAN, HARD, TIGHT STONES FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, GRADDED IN SIZE FROM ONE-HALF INCH DOWN, NOT MORE THAN FIVE PER CENT BY WEIGHT OVER AND UNDER, PASSING A SIEVE HAVING FOUR MESHES PER LINEAL FOOT AND NO INTERMEDIATE SIZES SHALL BE REMOVED.
- D. CONDUIT GRAVEL: THE GRAVEL SHALL CONSIST OF CLEAN, TIGHT STONES, FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, GRADDED IN SIZE FROM ONE-HALF INCH DOWN, NOT MORE THAN FIVE PER CENT BY WEIGHT OVER AND UNDER, PASSING A SIEVE HAVING FOUR MESHES PER LINEAL FOOT AND NO INTERMEDIATE SIZES SHALL BE REMOVED.
- E. WATER: THE WATER USED FOR MIXING OR SPREADING CONCRETE SHALL BE CLEAN AND FREE FROM OIL, SALT, ALKALI, SUGAR, OR OTHER DETRIMENTAL IMPURITIES. WHEN POSSIBLE CITY WATER WILL BE USED.
- F. STEEL: ALL REINFORCEMENT BEFORE BEING PLACED SHALL BE FREE FROM LOOSE RUST SCALE, OIL, CLAY OR OTHER COATING THAT WILL WEATHER OR REDUCE THE BOND. THE STEEL SHALL CONFORM TO THE LATEST EDITION OF "SPECIFICATION FOR REBARS AND BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT" ASTM A-615.
- III. FIELD TEST FOR MATERIALS
- FIELD TESTS SHALL BE MADE AS OFTEN AS IS NECESSARY TO INSURE THE MATERIALS CONFORMING TO THE FOREGOING SPECIFICATIONS. THE METHOD OF MAKING THESE TESTS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS FOR CONCRETE AND CONCRETE AGGREGATES.
- IV. CLASSIFICATION OF CONCRETE AND MIX DESIGN
- A. TABLE 1
- | CLASS OF CONCRETE  | 1        | 2        | 3                 |
|--|----------|----------|-------------------|
| 3000 psi   | 3000 psi | 3000 psi | 3000 psi          |
| MINIMUM COMPRESSIVE STRENGTH (INCLUDING FREE SURFACE MOISTURE) |          |          |                   |
| RATIO OF WATER TO CEMENT BY WEIGHT                             | .60      | .59      | .58               |
| GALLONS PER CUBIC YARD   | 7.5      | 6.5      | 5.5               |
| MINIMUM CEMENT CONTENT (POUNDS PER CUBIC YARD)                 | 375      | 320      | 300               |
| SACKS PER CUBIC YARD   | 9        | 8.0      | 7.5               |
| TYPE CEMENT  | I        | II       | III, (WITH 61% S) |
| AGGREGATE GRADE  | 5"-4"    | 5"-4"    | 5"-4"             |
| MINIMUM FINES AGGREGATE (PERCENT)                              | 80%      | 70%      | 57%               |
| MAXIMUM AGGREGATE SIZE   | 1 1/2"   | 1 1/2"   | 1 1/2"            |
- NOTES:  
 1. FOR DUCT LINE INSTALLATION USE CLASS 1 (3000+1) CONCRETE, OR AS SPECIFIED ON PLANS.  
 2. FOR MANHOLE AND VAULT INSTALLATION USE CLASS 2 (3000+2) CONCRETE.  
 3. FOR STREET BASE REPAIR USE CLASS 3 (3000+3) CONCRETE.
- B. READY-MIX CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR READY-MIX CONCRETE" ASTM C-94.
- C. CONCRETE MADE BY VOLUNTARY BATCHING AND CONTINUOUS MIXING SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR CONCRETE MADE BY VOLUNTARY BATCHING AND CONTINUOUS MIXING" ASTM C-685.
- D. ALL CONCRETE SHALL BE PLACED WITHIN ONE HOUR AFTER MIXING.
- V. PLACING OF CONCRETE
- A. DUCT LINES: THE CONCRETE FOR CONDUIT LINES SHALL BE PLACED IMMEDIATELY AFTER MIXING. THE CONCRETE WILL BE SO THUMPED OR PULVERED SO AS TO MAKE A DENSE CONCRETE ENVELOPE AROUND THE DUCTS. IF NECESSARY TO JOIN A NEW CONDUIT LINE INTO ONE IN WHICH THE CONCRETE HAS SET, THE OLD SURFACE SHALL BE CLEANED, ROUNDED AND WETTED.
- B. MANHOLES AND TRANSFORMER VAULTS: THE CONCRETE FOR MANHOLES AND VAULTS SHALL BE PLACED IMMEDIATELY AFTER MIXING. THE CONCRETE SHALL BE PLACED OUT TO KEEP THE SURFACE OF THE CONCRETE LEVEL TO PREVENT ANY FLOWING OF THE CONCRETE IN THE FORM. THE CONCRETE SHALL BE CONTINUOUSLY STRUCK TO EXPEL AIR BUBBLES. THE TOP OF THE WALLS SHALL BE WELL CURBED, ROUNDED AND WETTED IMMEDIATELY BEFORE FINISHING THE ROOF SLAB.
- C. STREET PAVEMENT: SEE DETAIL #20
- VI. PROTECTION OF FRESH CONCRETE
- CONCRETE SHALL BE KEPT MOIST BY SPRINKLING WITH WATER FOR A PERIOD SUITABLE TO THE CHARACTER OF THE STRUCTURE. MIXING OR SPREADING OVER FRESHLY PLACED CONCRETE SHALL NOT BE PERMITTED UNTIL ONE DAY AFTER PLACEMENT. FRESHLY PLACED CONCRETE SHALL BE WELL PROTECTED FOR AT LEAST FORTY-EIGHT HOURS AFTER PLACEMENT. FORM AND BRACING FOR WALLS OF MANHOLES AND TRANSFORMER VAULTS SHALL NOT BE REMOVED UNTIL THE FIRST THIRTY-SIX HOURS AFTER CONCRETE HAS BEEN PLACED. FORM AND BRACING FOR ROOF SLABS AND TRANSFORMER VAULTS SHALL NOT BE REMOVED FOR AT LEAST SEVEN DAYS AFTER CONCRETE HAS BEEN PLACED.
- VII. FINISH
- UNLESS ESPECIALLY CALLED FOR, NO MORE IS TO BE DONE BY WAY OF FINISHING CONCRETE TO SURFACE AFTER THE FORMS ARE REMOVED, EXCEPT THAT SERIOUS FAULTS IN THE CONCRETE SURFACE SHALL BE CHISELED OUT AND PATCHED WITH FRESH CONCRETE IN SUCH A MANNER THAT THE PATCH IS SEAMLESSLY JOINED INTO THE CONCRETE SURFACE.

AS-BUILT  
NOVEMBER 4, 2004

NOTE: THESE PLANS HAVE BEEN REVISED TO CONFORM WITH CONSTRUCTION RECORDS PROVIDED BY CONTRACTOR.

CD

TU ELECTRIC

UNIT ID

DWG TYPE

ESTIMATE

W.A.

LIST OF DRAWINGS

SCALE: (H-NO SCALE) (V-NO SCALE)

NETWORK UNDERGROUND APPURTENANCE SHEETS MISCELLANEOUS DETAILS

DATE: 05-12-92

APP. JES

APP. JES

ENG. JRC

CH. JRC

DATE: 05-12-92

APP. JES

APP. JES

W.A. NO.

DATE

REVISION DESCRIPTION

CH. APP.

APP.

E-NUA-1 SHEET NO.